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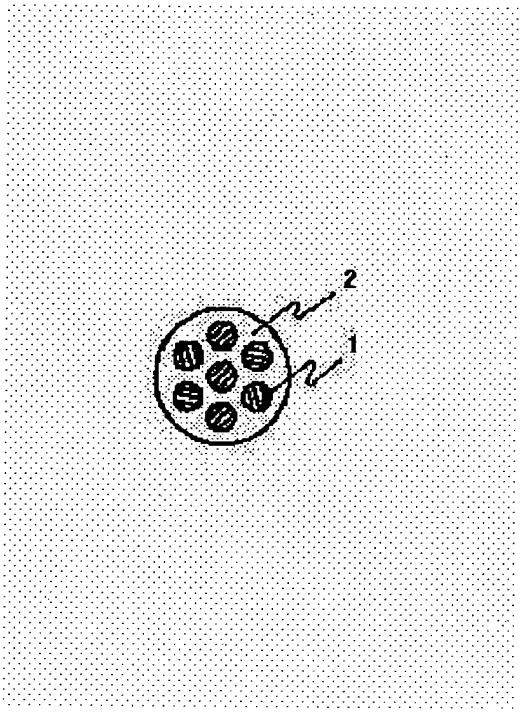
(54) FIBER FROM WHICH SUPERFINE FIBERS CAN BE GENERATED, SUPERFINE FIBERS GENERATED THEREFROM AND FIBER SHEET USING THE SUPERFINE FIBERS

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain a fiber capable of generating superfine fibers which are not pressed and adhered to each other even when cut, are homogeneously dispersed, and are useful for producing filter materials, etc., by enabling the generation of the superfine fibers that contain high melting point polypropylene having a melting point of a prescribed value or larger and have a fiber diameter of a specified value or smaller.

SOLUTION: This fiber can generate superfine fibers which contain high melting point polypropylene having a melting point of ≥166°C and have a fiber diameter of ≤5 μm. The superfine fiber-generable fiber has a sea-island like fiber cross section. The high melting point polypropylene is contained in the island component 1, and the island component 1 has a diameter of ≤2 μm. A value obtained by dividing the standard deviation of the diameter of the island component 1 by the average diameter of the island component 1 is ≥0.2. The superfine fibers generated from the super fine fiber-generable fibers are preferably used for preparing fiber sheets.



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CLAIMS

[Claim(s)]
[Claim 1] Fiber which the melting point is fiber containing high-melting polypropylene 166 degrees C or more which can be super-thin fiber generated, and is characterized by the ability of the diameter of fiber to generate super-thin fiber 5 micrometers or less and which can be super-thin fiber generated.
[Claim 2] Fiber according to claim 1 which the fiber which can be super-thin fiber generated has a sea island-like fiber cross-section configuration, and is characterized by containing high-melting polypropylene in the island component and which can be super-thin fiber generated.
[Claim 3] Fiber according to claim 2 which is characterized by an island component consisting only of high-melting polypropylene and which can be super-thin fiber generated.
[Claim 4] Fiber according to claim 2 to which an island component is characterized by the polymer of this low-melt point point constituting a part of front face [at least] of an island component including the polymer of a low-melt point point rather than high-melting polypropylene and this high-melting polypropylene and which can be super-thin fiber generated.
[Claim 5] Fiber according to claim 2 to 4 which is characterized by the diameter of an island component being 2 micrometers or less and which can be super-thin fiber generated.
[Claim 6] Fiber according to claim 2 to 5 which is characterized by the value which **(ed) the standard deviation value of the diameter of an island component by the average of the diameter of an island component being 0.2 or less and which can be super-thin fiber generated.
[Claim 7] Super-thin fiber containing the high-melting polypropylene generated from the fiber according to claim 1 to 6 which can be super-thin fiber generated.
[Claim 8] The fiber sheet characterized by including super-thin fiber according to claim 7.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the fiber which can be super-thin fiber generated, the super-thin fiber generated from now on, and the fiber sheet using this super-thin fiber.
[0002]
[Description of the Prior Art] Since the super-thin fiber whose diameter of fiber is 5-micrometer or less extent has the small diameter of fiber, if it is used as fiber which constitutes filter media, a more detailed solid-state is separable. Thus, since it will be thought that separability ability improves more if the diameter of fiber of super-thin fiber is small, it is desirable to use the smaller super-thin fiber of the diameter of fiber as fiber which constitutes filter media. Moreover, as for this super-thin fiber, it is desirable that the polypropylene which is excellent in respect of chemical resistance, electret nature, etc. is included.
[0003] The filter media (nonwoven fabric) containing this suitable polypropylene super-thin fiber carry out spinning of the sea island fiber which uses polypropylene as an island component, after cutting them out to predetermined die length, they carry out dissolution removal of the sea component, and after they subsequently create a fiber web, they can manufacture it by combining this fiber web. However, since there was an inclination which island components stick by pressure the more in case sea island fiber is judged the more the diameter of fiber of polypropylene super-thin fiber becomes small according to this approach, there was a problem that the fiber web of uniform conditions was not obtained and the filter media (nonwoven fabric) of conditions uniform as that result were not obtained. Such an inclination was remarkable when the diameter of an island component was 2 micrometers or less.
[0004]
[Problem(s) to be Solved by the Invention] It is made in order that this invention may solve the above-mentioned trouble, and it aims at offering the fiber which is not stuck by pressure even if it judges and which can be super-thin fiber generated, the super-thin fiber generated from now on, and the fiber sheet using this super-thin fiber.
[0005]
[Means for Solving the Problem] The fiber of this invention which can be super-thin fiber generated is fiber in which the melting point contains high-melting polypropylene 166 degrees C or more and which can be super-thin fiber generated, and the diameter of fiber is fiber which can generate super-thin fiber 5 micrometers or less. This melting point has rigidity, probably because high-melting polypropylene 166 degrees C or more has high crystallinity, and it found out not being stuck by pressure, even if it judges the fiber containing this high-melting polypropylene which can be super-thin fiber generated.
[0006] Since the super-thin fiber of this invention is a thing containing the high-melting polypropylene generated from the above fiber which can be super-thin fiber generated, even if it judges, the super-thin fiber which super-thin fiber was not stuck by pressure, or were judged is not sticking it by pressure. Therefore, it can distribute to homogeneity.
[0007] Since the fiber sheet of this invention is a thing containing the above-mentioned super-thin fiber,

the conditions which super-thin fiber distributed to homogeneity are excellent.
[0008]
[Embodiment of the Invention] As for the fiber of this invention which can be super-thin fiber generated, the melting point contains high-melting polypropylene 166 degrees C or more. Since the melting point of common polypropylene is about 160 degrees C, the crystallinity of the high-melting polypropylene which constitutes the fiber of this invention which can be super-thin fiber generated is more high. Since it is thought the more that rigidity becomes high more and it is hard that it comes to generate sticking by pressure at the time of decision the more the crystallinity of high-melting polypropylene is high, as for the melting point, it is more desirable that it is 168 degrees C or more. In addition, in high-melting polypropylene, olefin components, such as ethylene, may be intermingled as a copolymerization component.
[0009] The melting point in this invention says the temperature which gives the maximal value of the fusion endoergic curve obtained from a room temperature by carrying out a temperature up by part for programming-rate/of 10 degrees C using a differential scanning calorimeter. In addition, in a certain case, the maximal value makes the melting point the two or more most hot maximal value.
[0010] when such high-melting polypropylene judges the fiber which can be super-thin fiber generated, it is not stuck by pressure -- as -- the inside of fiber which can be super-thin fiber generated, and more than 5mass% -- being contained -- desirable -- more than 10mass% -- being contained is more desirable. In addition, it is desirable that it is less than [90mass%] so that super-thin fiber can be generated.
[0011] Although the fiber of this invention which can be super-thin fiber generated contains the above high-melting polypropylene, especially the high-melting polypropylene's existence condition is not limited. For example, as are shown in drawing 1 and it is shown in the condition and drawing 2 which exist as the island component 1 or the sea component 2 of the sea island fiber which has a sea island-like fiber cross-section configuration As shown in the condition and drawing 3 which exist as the 1st component 3 or the 2nd component 4 of the Orange fiber which has an Orange-like fiber cross-section configuration, there is the condition of existing as the 1st component 3 or the 2nd component 4 of the multiplex bimetal fiber which has the fiber cross-section configuration which carried out the laminating of the resinous principle etc. It is desirable that high-melting polypropylene is contained in the island component of the sea island fiber which has also in these the sea island-like fiber cross-section configuration where the smaller super-thin fiber of the diameter of fiber can be generated.
[0012] In addition, in the case of sea island fiber, in the case of Orange fiber and multiplex bimetal fiber, the diameter of an island component is [the diameter of the 1st component or the 2nd component] 5 micrometers or less so that the diameter of fiber can generate super-thin fiber 5 micrometers or less. In this invention, since high-melting polypropylene is included, even if said diameter (an island component, the 1st component, the 2nd component) is 2 micrometers or less, it can judge, without being stuck by pressure. In addition, in this invention, when the cross-section configuration of a super-thin fiber and island component, the 1st component, or the 2nd component is un-circular, these diameters of fiber or diameters say the diameter of circle with the same cross section.
[0013] When this high-melting polypropylene exists as an island component of sea island fiber, or when it exists as the 1st component or the 2nd component of Orange fiber or multiplex bimetal fiber, these components (an island component, the 1st component, or the 2nd component) may consist of only high-melting polypropylene, and may contain polymers other than high-melting polypropylene. For example, if the polymer of this low-melt point point constitutes a part of front face [at least] of these components (an island component, the 1st component, or the 2nd component) from high-melting polypropylene including the polymer of a low-melt point point in addition to high-melting polypropylene After generating the super-thin fiber which consists of an island component, the 1st component, or the 2nd component from the fiber which can be super-thin fiber generated, by pasting up the polymer of a low-melt point point, reinforcement can be given to a fiber sheet or fiber can be fixed. Moreover, if the polymer from which this contraction differs including the polymer in which contraction by heat differs from high-melting polypropylene in addition to high-melting polypropylene is unevenly distributed (for example, the shape of the shape of lamination, and eccentricity), after generating the super-thin fiber

which consists of an island component, the 1st component, or the 2nd component from the fiber which can be super-thin fiber generated, curliness can be made to be able to discover by heat treatment and flexibility and elasticity can be given to a fiber sheet.

[0014] In case it pastes up, one desirable [one lower (that is, 156 degrees C or less) 10 degrees C or more than the melting point of high-melting polypropylene] and low (that is, 146 degrees C or less) 20 degrees C or more of the melting point of the polymer of the above-mentioned low-melt point point is more desirable so that high-melting polypropylene may not fuse. As a polymer of such a low-melt point point, there is polyethylene, such as high density polyethylene, medium density polyethylene, low density polyethylene, straight chain-like low density polyethylene, and a polyethylene copolymer, copolymerization polypropylene, or polybutylene succinate, for example.

[0015] The polymer of this low-melt point point constitutes a part of front face [at least] of an island component, the 1st component, or the 2nd component so that it can paste up. As for the polymer of this low-melt point point, it is desirable to form 30% or more of the front face of an island component, the 1st component, or the 2nd component, and occupying 60% or more is more desirable so that it may excel in an adhesive property. since [in addition,] there is an inclination which is easy to stick by pressure when it judges when the ratio of high-melting polypropylene becomes low -- high-melting polypropylene -- the inside of an island component, the 1st component, or the 2nd component, and more than 25mass% -- being contained is desirable.

[0016] Rather than high-melting polypropylene and high-melting polypropylene which constitute the fiber of this invention which can be super-thin fiber generated, polymers other than the polymer of a low-melt point point As (for example, a polymer which constitutes the 1st or 2nd component of the polymer which constitutes the sea component of sea island fiber, Orange fiber, or multiplex bimetal fiber) for example, in removing a polymer like [in the case of removing the sea component of sea island fiber] As opposed to the solvent from which high-melting polypropylene (the polymer of a low-melt point point is also included when the polymer of a low-melt point point is included rather than high-melting polypropylene) is removed only less than [5mass%] more than 95mass%, when a removable polymer can be used and external force divides Orange fiber and multiplex bimetal fiber High-melting polypropylene (when the polymer of a low-melt point point is included rather than high-melting polypropylene, the polymer of a low-melt point point is also included), and the polymer of poor-looking solubility can be used. More specifically, in the case of the former, removable polyester (polyethylene terephthalate, a polyethylene terephthalate system copolymer, polybutylene terephthalate, a polybutylene terephthalate system copolymer, polyglycolic acid, a glycolic-acid copolymer, polylactic acid, lactic-acid copolymer, etc.) and polyethylene (low density polyethylene, straight chain-like low density polyethylene, medium density polyethylene, high density polyethylene, polyethylene system copolymer) can be combined to the solvent of an alkali water solution. Also in these, the polyester the polylactic acid which can raise the crystallinity of polypropylene comparatively according to elongation or the extension process which becomes empty, and whose intrinsic viscosity (it measures with an Ostwald viscometer at 30 degrees C using 60:40 (weight ratio) mixed solvent of a phenol and 1,1,2,2-tetrachloroethane) are or less 0.6 extent is suitable. Moreover, in the case of the latter, a polyamide, polyester (nylon 6, Nylon 66, nylon system copolymer, etc.) (polyethylene terephthalate, a polyethylene terephthalate system copolymer, polybutylene terephthalate, a polybutylene terephthalate system copolymer, polyglycolic acid, a glycolic-acid copolymer, polylactic acid, lactic-acid copolymer, etc.), etc. are combinable.

[0017] Since the nonwoven fabric which distributed this super-thin fiber as the diameter of the super-thin fiber generated from the fiber of this invention which can be super-thin fiber generated is almost the same is what has a uniform aperture and is [ability / separability] excellent, it is desirable that the diameter of an island component, the 1st component, or the 2nd component is almost the same. That is, it is desirable that the value which **(ed) the standard deviation value of the diameter of an island component, the 1st component, or the 2nd component by the average of the diameter of an island component, the 1st component, or the 2nd component is 0.2 (0.18 or less [Preferably]) or less. Saying that average that the average of the diameter of this island component, the 1st component, or the 2nd

component took the electron microscope photograph of the fiber which can be super-thin fiber generated, or the generated super-thin fiber, and measured the diameter of 100 or more (n pieces) island components of this electron microscope photograph, the 1st component, or the 2nd component, a standard deviation value says the value which computed the measured diameter (chi) from the following formula.

Standard-deviation ={(nsigmachi 2-(sigmachi) 2) /n (n-1)} 1/2n: The number chi of the island component of which measurement was done, the 1st component, or the 2nd components: The diameter of each island component, the 1st component, or the 2nd component [0018] In addition, the cross-section configuration of the fiber of this invention which can be super-thin fiber generated does not need to be circular. When you may be a non-round shape (for example, the shape of the shape of the shape of the shape of the shape of the shape of the shape of an ellipse, and an ellipse, and T, and Y, and +, and hollow, and a polygon etc.) and the fiber which can be super-thin fiber generated is sea island fiber The cross-section configuration of the island component does not need to be circular, either, and you may be a non-round shape (for example, the shape of the shape of the shape of the shape of the shape of the shape of the shape of an ellipse, and an ellipse, and T, and Y, and +, and hollow, and a polygon etc.). Moreover, into the polymer (for example, high-melting polypropylene) which constitutes the fiber which can be super-thin fiber generated, functional matter, such as a desiccant, a flatting, a pigment, a flame retarder, a stabilizer, an antistatic agent, a coloring agent, a stain, an electric conduction agent, a hydrophilization agent, a deodorant, or an antimicrobial agent, can be mixed, and various functions can also be added.

[0019] Moreover, although especially the fineness of the fiber which can be super-thin fiber generated is not limited, about 0.8-10 deniers is suitable. Moreover, although especially fiber length is not limited, either, when generating the super-thin fiber which constitutes a dry type nonwoven fabric, about 25-160mm is suitable [when generating the super-thin fiber which constitutes a wet nonwoven fabric, about 0.5-30mm is suitable, and].

[0020] Spinning of such fiber of this invention that can be super-thin fiber generated can be carried out using the compound spinning method and/or blend spinning method of a conventional method. For example, after carrying out spinning of the sea island fiber which an island component becomes from high-melting polypropylene, and a sea component becomes from polylactic acid by making melt spinning temperature into 210-245 degrees C, it can be extended and can manufacture the fiber which can be super-thin fiber generated. In addition, you may judge after extension so that it may be easy to manufacture a nonwoven fabric etc. using the fiber of this invention which can be super-thin fiber generated. Since the fiber of this invention which can be super-thin fiber generated contains high-melting polypropylene, it can obtain the staple fiber which is not stuck by pressure in the decision section and which can be super-thin fiber generated. As this decision approach, it can carry out by well-known approaches, such as a guillotine cutter, a rotary cutter, and a pushing-out cutter, for example. Moreover, when using the fiber which can be super-thin fiber generated as spun yarn as a raw material of a dry type nonwoven fabric, it is desirable to give about 5-50 curliness/inch mechanically or thermally.

[0021] In addition, it is desirable to combine with what, and considers as temperature high as it cuts without 90 degrees C or more and a polymer fusing extension temperature, or is excellent in ductility as polymers other than polypropylene resin. [that molecular weight distribution (weight average molecular weight/number average molecular weight) use six or less (5 or less / Preferably /) thing as polypropylene resin used so that the melting point of the polypropylene which constitutes the fiber of this invention which can be super-thin fiber generated may become a thing high-melting / of 166 degrees C or more] In addition, weight average molecular weight and number average molecular weight can use 1,2,4-trichlorobenzene for a solvent, and can measure it as polystyrene conversion molecular weight by the GPC method (gel permeation chromatography) at the temperature of 180 degrees C.

[0022] In addition, the fiber with the almost same diameter of the above island components, the 1st component, or the 2nd component which can be super-thin fiber generated can be obtained by the well-known compound spinning method. for example, the sea island fiber with the almost same diameter of

an island component -- the spinneret section -- the inside of a sea component -- a mouthpiece -- it can regulate and can manufacture by the approach of extruding an island component and compounding.
[0023] Since the super-thin fiber of this invention is a thing containing the high-melting propylene generated from the above fiber which can be super-thin fiber generated, even if it judges, the super-thin fiber which super-thin fiber was not stuck by pressure, or were judged is not sticking it by pressure. Therefore, it can distribute to homogeneity. As opposed to the solvent which the generating approach of this super-thin fiber changes with fiber which can be super-thin fiber generated, for example, has fiber which can be super-thin fiber generated The polymer in which more than 95mass% removal is possible, When consisting of a high-melting propylene removed only less than [5mass%] to the solvent, by being immersed during the solvent bath When the super-thin fiber which consists of high-melting polypropylene can be generated and the fiber which can be super-thin fiber generated consists of combination of high-melting polypropylene, a high-melting propylene, and a poor-looking solubility polymer For example, super-thin fiber can be generated by making the external force of a fluid style, a calendering roll, a flat press, etc. act.
[0024] The fiber sheet of this invention contains the super-thin fiber generated from the above-mentioned fiber which can be super-thin fiber generated. Since the super-thin fiber generated from the above-mentioned fiber which can be super-thin fiber generated can be distributed to homogeneity, the fiber sheet (especially nonwoven fabric) containing this super-thin fiber is excellent in conditions. In addition, if it is in the condition that super-thin fiber pasted up, it will be the excellent fiber sheet of tension strength or rigidity, and if it is in the condition that super-thin fiber discovered curliness, it will be the fiber sheet which is excellent in flexibility or elasticity. As a mode of this fiber sheet, textiles, knitting, nonwoven fabrics, or these complex exist, for example.
[0025] in the fiber sheet of this invention, the above super-thin fiber is excellent in the engine performance by super-thin fiber existing, for example, separability ability, flexibility, compactness, etc. -- as -- more than 10mass% -- being contained -- desirable -- more than 20mass% -- being contained -- more -- desirable -- more than 30mass% -- being contained is most desirable.
[0026] Usual fiber can be used as fiber other than this super-thin fiber. For example, natural fibers, such as inorganic fibers, such as a glass fiber and a carbon fiber, silk, wool, cotton, and hemp, Semi-synthetic fibers, such as regenerated fibers, such as a rayon fiber, and an acetate fiber, a polyamide fiber, Vinylon, an acrylic fiber, polyester fiber, polyvinyl chloride system fiber, It consists of polyvinylidene chloride fiber, a polyurethane fiber, a polyethylene fiber, a polypropylene fiber, poly methyl pentene fiber, aromatic polyamide fiber, or two or more kinds of resinous principles, and synthetic fibers, such as a bicomponent fiber which has curliness manifestation nature, a heat adhesive property, or division nature, can be used.
[0027] The fiber sheet of this invention can be manufactured with a conventional method. For example, the wet nonwoven fabric containing the super-thin fiber generated from the above fiber which can be super-thin fiber generated can be manufactured as follows. First, the above super-thin fiber is prepared. When this super-thin fiber is not a staple fiber, it judges to request die length by well-known approaches, such as a guillotine cutter, a rotary cutter, and a pushing-out cutter.
[0028] Subsequently, a fiber web is formed for this super-thin fiber with the wet methods (for example, a level length network method, an inclination wire type long network method, a cylinder-mould method, or a long network, a cylinder-mould combination method, etc.) of a conventional method (also in case of fiber which is others by the need). Subsequently, this fiber web can be combined and a wet nonwoven fabric can be manufactured. As this joint approach, there are an approach of pasting up by the approach of interlacing by fluid styles, such as (1) stream, (2) super-thin fiber, and the heat-adhesive fiber mixed by the case, a method of applying or sprinkling and pasting up (3) binders, etc., for example. In addition, these joint approach can be used together.
[0029] since the fiber sheet of this invention is what is excellent in the conditions which super-thin fiber distributed to homogeneity -- various applications, for example, the padding cloth for garments, and the object for garments -- a break -- it can be used for the filter media of cotton, interior material, a gas, or a liquid, various cleaning sheets, the sheet for engineering works, the separator for cells, the base fabric

for pasting material, the base material for wallpaper, the base fabric for synthetic leather, the base fabric for artificial leather, moisture permeation waterproof canvas, etc. In addition, various functions can be added and various applications can be made to suit dyeing processing, coloring processing according the fiber sheet of this invention to a pigment, piloerection processing, lamination processing, fabrication, embossing processing, or by carrying out chemical or physical surface treatment.

[0030] Although the example of this invention is indicated below, it is not limited to the following examples. In addition, the melt index of polypropylene is JIS. It is the value measured according to K6758, and the melt index of polyethylene is ASTM. It is the value measured according to D1238.

[0031]

[Example] (Example 1) The compound spinning equipment (spinning is possible in the sea island fiber of 25 islands) of the conventional method which can carry out spinning of the sea island fiber was used, polypropylene (melt index : 65 molecular-weight-distribution:5.1) was extruded for Polly L-lactic acid under the gear-pump ratio 75:25 and conditions with a temperature of 240 degrees C as an island component as a sea component, and spinning of the non-extended yarn with a fineness of 4.2 deniers was carried out. subsequently, this non-extended yarn was cut out with the guillotine cutter, after performing extension 3.4 times at the temperature of 90 degrees C, and the staple fiber (cross-section: -- cross-section configuration [of value:0.085 (count: 100) which **(ed) less than / of circular and an island component / diameter:1.7micrometer / and the standard deviation value of the diameter of an island component by the average of the diameter of an island component, and an island component]: -- circular) with a fineness [of 1.2 deniers] and a fiber length of 3mm which can be super-thin fiber generated was manufactured. When the cross section of this staple fiber that can be super-thin fiber generated was observed with the electron microscope photograph, it had the front face judged without being stuck by pressure.

[0032] Subsequently, this staple fiber that can be super-thin fiber generated was immersed for 30 minutes into the temperature of 80 degrees C, and a 1M-sodium-hydroxide water solution, decomposition removal of the Polly L-lactic acid which is a sea component was carried out, and the value which **(ed) the standard deviation value of 1.2 micrometers of diameters of average fiber and the diameter of fiber of super-thin fiber by the average of the diameter of fiber of super-thin fiber manufactured the polypropylene super-thin staple fiber (cross section: circular) of 0.085 (count: 100). When the melting point of this polypropylene super-thin staple fiber was measured using the differential scanning calorimeter, it was 170.3 degrees C. Subsequently, when it distributed underwater [containing the copolymer (thickener) and the polyoxyethylene nonylphenyl ether (surfactant) of acrylamide and acrylic-acid sodium], there is no lump of fiber and homogeneity was able to be made to distribute this polypropylene super-thin staple fiber.

[0033] (Example 2) The compound spinning equipment (spinning is possible in the sea island fiber of 25 islands) of the conventional method which can carry out spinning of the sea island fiber was used, polypropylene (melt index : 65 molecular-weight-distribution:5.1) was extruded for Polly L-lactic acid under the gear-pump ratio 50:50 and conditions with a temperature of 240 degrees C as an island component as a sea component, and spinning of the non-extended yarn with a fineness of 4.1 deniers was carried out. subsequently, this non-extended yarn was cut out with the guillotine cutter, after performing extension 3.3 times at the temperature of 90 degrees C, and the staple fiber (cross-section: -- cross-section configuration [of value:0.053 (count: 100) which **(ed) less than / of circular and an island component / diameter:3.5micrometer / and the standard deviation value of the diameter of an island component by the average of the diameter of an island component, and an island component]: -- circular) with a fineness [of 3.4 deniers] and a fiber length of 3mm which can be super-thin fiber generated was manufactured. When the cross section of this staple fiber that can be super-thin fiber generated was observed with the electron microscope photograph, it had the front face judged without being stuck by pressure.

[0034] Subsequently, this staple fiber that can be super-thin fiber generated was immersed for 30 minutes into the temperature of 80 degrees C, and a 1M-sodium-hydroxide water solution, decomposition removal of the Polly L-lactic acid which is a sea component was carried out, and the

value which **(ed) the standard deviation value of 3 micrometers of diameters of average fiber and the diameter of fiber of super-thin fiber by the average of the diameter of fiber of super-thin fiber manufactured the polypropylene super-thin staple fiber (cross section: circular) of 0.053 (count: 100). When the melting point of this polypropylene super-thin staple fiber was measured using the differential scanning calorimeter, it was 168.0 degrees C. Subsequently, when this polypropylene super-thin staple fiber was distributed like the example 1, there is no lump of fiber and homogeneity was able to be distributed.

[0035] (Example of a comparison) The compound spinning equipment (spinning is possible in the sea island fiber of 25 islands) of the conventional method which can carry out spinning of the sea island fiber was used, polypropylene (melt index : 21 molecular weight distribution 6.3) was extruded for the polyethylene terephthalate (intrinsic viscosity: 0.54) which uses 5-sulfoisophtharate as a copolymerization component as a sea component under the gear-pump ratio 91:39 and conditions with a temperature of 295 degrees C as an island component, and spinning of the non-extended yarn with a fineness of 3 deniers was carried out. subsequently, this non-extended yarn was cut out with the guillotine cutter, after performing extension 1.9 times at the temperature of 90 degrees C, and the staple fiber (cross-section: -- cross-section configuration [of value:0.14 (count: 100) which **(ed) less than / of circular and an island component / diameter:1.8micrometer / and the standard deviation value of the diameter of an island component by the average of the diameter of an island component, and an island component]: -- circular) with a fineness [of 1.7 deniers] and a fiber length of 3mm which can be super-thin fiber generated was manufactured. When the cross section of this staple fiber that can be super-thin fiber generated was observed with the electron microscope photograph, it had the front face which island components stuck by pressure.

[0036] Subsequently, this staple fiber that can be super-thin fiber generated was immersed for 45 minutes into the temperature of 80 degrees C, and a 1M-sodium-hydroxide water solution, decomposition removal of the polyethylene terephthalate which is a sea component was carried out, and the value which **(ed) the standard deviation value of 1.1 micrometers of diameters of average fiber and the diameter of fiber of super-thin fiber by the average of the diameter of fiber of super-thin fiber manufactured the polypropylene super-thin staple fiber (cross section: circular) of 0.14 (count: 100). When the melting point of this polypropylene super-thin staple fiber was measured using the differential scanning calorimeter, it was 164.4 degrees C. Subsequently, when this polypropylene super-thin staple fiber was distributed like the example 1, the dispersibility which remained in the shape of a fiber bundle, without distributing fiber, or was involved, and became a lump was bad.

[0037] (Example 3) The compound spinning equipment (spinning is possible in the sea island fiber of 25 islands) of the conventional method which can carry out spinning of the sea island fiber was used, polypropylene (melt index : 65 molecular-weight-distribution:5.1) 40mass% and high-density-polyethylene (melt index: 20) 60mass% were extruded for Polly L-lactic acid under the gear-pump ratio 50:50 and conditions with a temperature of 240 degrees C as an island component as a sea component, and spinning of the non-extended yarn with a fineness of 8 deniers was carried out. subsequently, this non-extended yarn was cut out with the guillotine cutter, after performing extension 2.4 times at the temperature of 90 degrees C, and the staple fiber (cross-section: -- cross-section configuration [of value:0.11 (count: 100) which **(ed) less than / of circular and an island component / diameter:1.7micrometer / and the standard deviation value of the diameter of an island component by the average of the diameter of an island component, and an island component]: -- circular) with a fineness [of 3.5 deniers] and a fiber length of 3mm which can be super-thin fiber generated was manufactured. When the cross section of this staple fiber that can be super-thin fiber generated was observed with the electron microscope photograph, it had the front face judged without being stuck by pressure.

[0038] Subsequently, this staple fiber that can be super-thin fiber generated is immersed for 30 minutes into the temperature of 80 degrees C, and a 1M-sodium-hydroxide water solution. Decomposition removal of the Polly L-lactic acid which is a sea component is carried out. 1.2 micrometers of diameters of average fiber, The value which **(ed) the standard deviation value of the diameter of fiber of super-thin fiber by the average value of the diameter of fiber of super-thin fiber manufactured the

polypropylene-high-density-polyethylene mixing super-thin staple fiber (cross section: high density polyethylene forms circular and 60% or more of a front face) of 0.11 (count: 100). When the melting point of the polypropylene component of this polypropylene-high-density-polyethylene mixing super-thin staple fiber and a high-density-polyethylene component was measured using the differential scanning calorimeter, the polypropylene component was 168.7 degrees C and the high-density-polyethylene component was 129.8 degrees C. When this polypropylene-high-density-polyethylene mixing super-thin staple fiber was distributed like the example 1, there is no lump of fiber and homogeneity was able to be distributed.

[0039] (Example 4) The polypropylene-high-density-polyethylene mixing super-thin staple fiber of an example 3 and the sheath-core mold compound adhesion staple fiber (the diameter of fiber of 11.8 micrometers, fiber length of 10mm) with which a heart component consists of polypropylene (melting point: 158 degrees C), and a sheath component (adhesion component) consists of high density polyethylene (melting point: 131 degrees C) were prepared.

[0040] Subsequently, said polypropylene-high-density-polyethylene mixing super-thin staple fiber and a sheath-core mold compound adhesion staple fiber The distributed bath which consists of water which contains an acrylamide-acrylic-acid sodium copolymer (thickener) and the polyoxyethylene nonylphenyl ether (surfactant) with a mass ratio 1:1 is distributed. After milling paper with a square shape hand papermaking paper machine, while drying at the temperature of 140 degrees C, the adhesion component of a sheath-core mold compound adhesion staple fiber and the high-density-polyethylene component of a polypropylene-high-density-polyethylene mixing super-thin staple fiber were pasted up, and the nonwoven fabric was manufactured. It had uniform conditions, and since the aperture of this nonwoven fabric was uniform, it was suitable as a separator for filter media or cells of a gas or a liquid.

[0041]

[Effect of the Invention] The fiber of this invention which can be super-thin fiber generated is not stuck by pressure, even if it judges. Moreover, even if it judges the super-thin fiber containing the high-melting polypropylene generated from the fiber of this invention which can be super-thin fiber generated, the super-thin fiber which super-thin fiber was not stuck by pressure, or were judged is not sticking it by pressure. Therefore, it can distribute to homogeneity. Furthermore, since the fiber sheet of this invention is a thing containing this super-thin fiber, the conditions which super-thin fiber distributed to homogeneity are excellent.

[Translation done.]